

### AMENDED CLAIMS

1. (currently amended) A method of pumping a wide bandwidth optical parametric oscillator to provide mid-IR radiation output, comprising the step of pumping the optical parametric oscillator with a Thulium laser using a laser wavelength of about 2 microns and operating by itself as a pump source for the optical parametric oscillator, wherein the optical parametric oscillator includes [a] two zinc germanium phosphide non-linear crystal crystals, and wherein each of the crystals generates a signal beam and an idler beam that are all part of the output from the optical parametric oscillator.
2. (original) The method of Claim 1, wherein the Thulium laser utilizes a YAlO<sub>3</sub> host.
3. (previously cancelled)
4. (original) The method of Claim 1, wherein the Thulium laser is Q-switched.
5. (currently amended) A method of pumping an optical parametric oscillator without utilizing Holmium, comprising the step of pumping the optical parametric oscillator with a Thulium laser using a laser wavelength of about 2 microns output, wherein the optical parametric oscillator includes [a] two zinc germanium phosphide crystal crystals, and wherein each of the crystals generates a signal beam and an idler beam, and wherein each of said crystals generates a signal beam and an idler beam that are all part of an output from the optical parametric oscillator.
6. (previously cancelled)
7. (previously cancelled)
8. (previously cancelled)
9. (previously amended) Apparatus for generating infrared radiation, comprising the combination of:
  - a Thulium laser using a laser wavelength of about 2 microns; and,
  - an optical parametric oscillator pumped by said Thulium laser, wherein said optical-parametric oscillator is in the form of a ring.
10. (original) The apparatus of Claim 9, wherein said Thulium laser is a Tm:YAlO<sub>3</sub> laser.
11. (original) The apparatus of Claim 9, wherein said optical parametric oscillator includes a ZnGeP<sub>2</sub> non-linear crystal.
12. (previously cancelled)
13. (previously amended) The apparatus of Claim 9, wherein said optical parametric oscillator includes two ZnGeP<sub>2</sub> non-linear crystals.

14. (cancelled)

15. (original) The apparatus of Claim 9, wherein said optical parametric oscillator is doubly resonant.

16. (original) The apparatus of Claim 9, wherein said optical parametric oscillator has a non-linear crystal selected from the group consisting of zinc germanium phosphide, silver gallium selenide, silver gallium indium selenide, gallium arsenide and lithium niobate crystals.

17. (original) The apparatus of Claim 9, wherein said Thulium laser is selected from the group consisting of YAG, YSGG, PALO, LuAG, YU,  $Y_2O_3$  and  $YVO_4$  Thulium lasers.

18. (original) The apparatus of Claim 9, wherein the optical parametric oscillator has a non-linear crystal selected from the group consisting of  $ZnGeP_2$ ,  $AgGaSe_2$ , AGIS  $AgGaS_2$ , OPGaAs and PPLN non-linear crystals.

19. (original) Apparatus for generating infrared radiation, comprising the combination of:  
a Thulium laser using a laser wavelength of about 2 microns; and,  
an optical parametric oscillator pumped by said Thulium laser wherein said optical parametric oscillator is double resonant.

20. (original) The apparatus of Claim 19, wherein said Thulium laser is a  $Tm:YAlO_3$  laser.

21. (original) The apparatus of Claim 19, wherein said optical parametric oscillator includes a  $ZnGeP_2$  non-linear crystal.

22. (original) The apparatus of Claim 21, wherein said optical parametric oscillator is in the form of a ring.

23. (original) The apparatus of Claim 22, wherein said optical parametric oscillator includes two  $ZnGeP_2$  non-linear crystals.

24. (original) The apparatus of Claim 21, wherein said optical parametric oscillator is in the form of a linear resonator.